

## WHAT IS CLAIMED IS:

1    1. A method for controlling a magnetic tape unit in  
2    response to a command from a command issuing apparatus  
3    comprising the steps of:

4                 in an open process for a file recorded on a  
5    magnetic tape, fixing a position of a head  
6    (hereinafter referred to as a real head position)  
7    relative to said magnetic tape at a predetermined  
8    position in said magnetic tape unit; and

9                 when receiving a command from said command  
10   issuing apparatus, executing emulation in which a tape  
11   operation according to said command is virtually  
12   carried out in said magnetic tape unit without making  
13   said magnetic tape unit carry out a real tape  
14   operation.

1    2. The method for controlling a magnetic tape unit  
2    according to claim 1, wherein in a close process for  
3    said file, an end-of-file label read by said magnetic  
4    tape unit in response to a command from said command  
5    issuing apparatus is saved in a save area, and;

6                 in an open process for said file, said  
7    end-of-file label is transferred to said command  
8    issuing apparatus from said save area in response to  
9    a command directing to read said end-of-file label  
10   without making said magnetic tape unit carry out a real

11 read operation.

1 3. The method for controlling a magnetic tape unit  
2 according to claim 1, wherein in a close process for  
3 said file, an end-of-file label written by said  
4 magnetic tape unit in response to a command from said  
5 command issuing apparatus is saved in a save area; and  
6               in an open process for said file, said  
7 end-of-file label is transferred to said command  
8 issuing apparatus from said save area in response to  
9 a command directing to read said end-of-file label  
10 without making said magnetic tape unit carry out a real  
11 read operation.

1 4. The method for controlling a magnetic tape unit  
2 according to claim 1, wherein in a close process for  
3 said file, said magnetic tape unit is made to carry  
4 out a real read operation to really read an end-of-file  
5 label, which is skipped in said magnetic tape unit in  
6 response to a command from said command issuing  
7 apparatus, said read end-of-file label is saved in a  
8 save area; and

9               in an open process for said file, said  
10 end-of-file label is transferred to said command  
11 issuing apparatus from said save area in response to  
12 a command directing to read said end-of-file label  
13 without making said magnetic tape unit carry out a real

14 read operation.

1   5. The method for controlling a magnetic tape unit  
2 according to claim 2, wherein when, in an open process  
3 for said file, a command directing to read said  
4 end-of-file label is received in a state in which said  
5 end-of-file label is not saved in said save area, said  
6 magnetic tape unit is made to carry out a real read  
7 operation to really read said end-of-file label, and  
8 said read end-of-file label is transferred to said  
9 command issuing apparatus.

1   6. The method for controlling a magnetic tape unit  
2 according to claim 1, wherein a data buffer for  
3 temporarily storing write data to said magnetic tape  
4 and read data from said magnetic tape therein is  
5 interposed between said command issuing apparatus and  
6 said magnetic tape unit to asynchronously carry out  
7 a read/write process between said command issuing  
8 apparatus and said data buffer and a read/write  
9 process between said data buffer and said magnetic  
10 tape unit.

1   7. The method for controlling a magnetic tape unit  
2 according to claim 1, wherein a tape operation of said  
3 magnetic tape unit is such controlled that, on said  
4 magnetic tape, the first tape mark is written after

5 the last data block of said file, the first end-of-file  
6 label and the second end-of-file label are written  
7 after said first tape mark, the second tape mark is  
8 written after said second end-of-file label, and the  
9 third tape mark is further written after said second  
10 tape mark when said file is the last on said magnetic  
11 tape, whereas the next file is written over said third  
12 tape mark to be written when the next file is  
13 additionally written after said file; and

14                 said emulation is executed between  
15 immediately before said first tape mark and  
16 immediately after said third tape mark while fixing  
17 said head at said predetermined position which is  
18 immediately after said second tape mark.

1 8. The method for controlling a magnetic tape unit  
2 according to claim 7, wherein while said emulation is  
3 executed, a virtual position of said head (hereinafter  
4 referred to as a virtual head position) relative to  
5 said magnetic tape in said magnetic tape unit is  
6 managed as a relative position of said head relative  
7 to said predetermined position.

1 9. The method for controlling a magnetic tape unit  
2 according to claim 8, wherein when a command requiring  
3 the real head position in said magnetic tape unit is  
4 received while said emulation is executed, a sum of

5 said predetermined position and said relative  
6 position is generated, and said sum is reported as the  
7 real head position to said command issuing apparatus.

1 10. The method for controlling a magnetic tape unit  
2 according to claim 8, wherein when said magnetic tape  
3 unit is shifted to a real operation while said  
4 emulation is executed, the real head position in said  
5 magnetic tape unit is generated as a sum of said  
6 predetermined position and said relative position,  
7 and said head in said magnetic tape unit is re-  
8 positioned at said real head position.

1 11. The method for controlling the magnetic tape unit  
2 according to claim 7, wherein in a state in which both  
3 of said first end-of-file label and said second  
4 end-of-file label are saved in said save areas, and  
5 in a state in which reading/writing up to said second  
6 tape mark is completed and the real head position is  
7 said predetermined position in said magnetic tape  
8 unit;

9           when any one of a read backward command, a back  
10 space block command and a back space file command is  
11 received, with said virtual head position being  
12 immediately after said second tape mark;

13           when any one of a read command, a read backward  
14 command, a back space block command, a back space file

15 command, a forward space block command, a forward  
16 space file command, and a write tape mark command is  
17 received, with said virtual head position being  
18 immediately after said second end-of-file label;

19 when any one of a read command, a read backward  
20 command, a back space block command, a back space file  
21 command, a forward space block command and a forward  
22 space file command is received, with said virtual head  
23 position being immediately after said first end-  
24 of-file label;

25 when any one of a read command, a read back  
26 command, a back space block command, a back space file  
27 command, a forward space block command and a forward  
28 space file command is received, with said virtual head  
29 position being immediately after said first tape mark;  
30 or

31 when any one of a read command, a forward space  
32 block command and a forward space file command is  
33 received, with said virtual head position being  
34 immediately after said last data block, said emulation  
35 is executed.

1 12. The method for controlling a magnetic tape unit  
2 according to claim 7, wherein in a state in which both  
3 of said first end-of-file label and said second  
4 end-of-file label are saved in said save areas, and  
5 in a state in which reading/writing up to said third

6      tape mark is completed and the real head position is  
7      said predetermined position in said magnetic tape  
8      unit;

9                when any one of a read backward command, a back  
10     space block command and a back space file command is  
11     received, with said virtual head position being  
12     immediately after said third tape mark;

13                when any one of a read command, a read backward  
14     command, a back space block command, a back space file  
15     command, a forward space block command, a forward  
16     space file command and a write tape mark command is  
17     received, with said virtual head position being  
18     immediately after said second tape mark;

19                when any one of a read command, a read backward  
20     command, a back space block command, a back space file  
21     command, a forward space block command and a forward  
22     space file command is received, with said virtual head  
23     position being immediately after said second end-  
24     of-file label;

25                when any one of a read command, a read backward  
26     command, a back space block command, a back space file  
27     command, a forward space block command and a forward  
28     space file command is received, with said virtual head  
29     position being immediately after said first end-  
30     of-file label;

31                when any one of a read command, a read backward  
32     command, a back space block command, a back space file

33 command, a forward space block command and a forward  
34 space file command is received, with said virtual head  
35 position is immediately after said first tape mark;  
36 or

37 when any one of a read command, a forward space  
38 block command and a forward space file command is  
39 received, with said virtual head position being  
40 immediately after said last data block, said emulation  
41 is executed.

1 13. The method for controlling a magnetic tape unit  
2 according to claim 7, wherein in a state in which only  
3 said first end-of-file label is saved in said save area,  
4 and in a state in which reading/writing up to said  
5 second tape mark is completed and the real head  
6 position is said predetermined position in said  
7 magnetic tape unit;

8 when any one of a read backward command, a back  
9 space block command and a back space file command is  
10 received, with said virtual head position being  
11 immediately after said second tape mark;

12 when any one of a read command, a read backward  
13 command, a back space block command, a back space file  
14 command, a forward space block command, a forward  
15 space file command and a write tape mark command is  
16 received, with said virtual head position being  
17 immediately after said second end-of-file label;

18       when any one of a read backward command, a back  
19 space block command, a back space file command, a  
20 forward space block command and a forward space file  
21 command is received, with said virtual head position  
22 being immediately after said first end-of-file label;

23       when any one of a read command, a read backward  
24 command, a back space block command, a back space file  
25 command, a forward space block command and a forward  
26 space file command is received, with said virtual head  
27 position being immediately after said first tape mark;

28 or

29       when any one of a read command, a forward space  
30 block command and a forward space file command is  
31 received, with said virtual head position being  
32 immediately after said last data block, said emulation  
33 is executed.

1 14. The method for controlling a magnetic tape unit  
2 according to claim 7, wherein in a state in which only  
3 said first end-of-file label is saved in said save area,  
4 and in a state in which reading/writing up to said  
5 third tape mark is completed and the real head position  
6 is said predetermined position in said magnetic tape  
7 unit;

8       when any one of a read backward command, a back  
9 space block command and a back space file command is  
10 received, with said virtual head position being

11 immediately after said third tape mark;

12       when any one of a read command, a read backward  
13 command, a back space block command, a back space file  
14 command, a forward space block command, a forward  
15 space file command and a write tape mark command is  
16 received, with said virtual head position being  
17 immediately after said second tape mark;

18       when any one of a read command, a read backward  
19 command, a back space block command, a back space file  
20 command, a forward space block command and a forward  
21 space file command is received, with said virtual head  
22 position being immediately after said second end-  
23 of-file label;

24       when any one of a read backward command, a back  
25 space block command, a back space file command, a  
26 forward space block command and a forward space file  
27 command is received, with said virtual head position  
28 being immediately after said first end-of-file label;

29       when any one of a read command, a read backward  
30 command, a back space block command, a back space file  
31 command, a forward space block command and a forward  
32 space file command is received, with said virtual head  
33 position being immediately after said first tape mark;

34 or

35       when any one of a read command, a forward space  
36 block command and a forward space file command is  
37 received, with said virtual head position being

38 immediately after said last data block, said emulation  
39 is executed.

1 15. The method for controlling a magnetic tape unit  
2 according to claim 7, wherein in a state in which only  
3 said second end-of-file label is saved in said save  
4 area, and in a state in which reading/writing up to  
5 said second tape mark is completed and the real head  
6 position is said predetermined position in said  
7 magnetic tape unit;

8 when any one of a read backward command, a back  
9 space block command and a back space file command is  
10 received, with said virtual head position being  
11 immediately after said second tape mark;

12 when any one of a read command, a read backward  
13 command, a back space block command, a back space file  
14 command, a forward space block command, a forward  
15 space file command and a write tape mark command is  
16 received, with said virtual head position being  
17 immediately after said second end-of-file label;

18 when any one of a read command, a read backward  
19 command, a back space block command, a back space file  
20 command, a forward space block command and a forward  
21 space file command is received, with said virtual head  
22 position being immediately after said first end-  
23 of-file label;

24 when any one of a read backward command, a back

25 space block command, a back space file command, a  
26 forward space block command and a forward space file  
27 command is received, with said virtual head position  
28 being immediately after said first tape mark; or  
29           when any one of a read command, a forward space  
30 block command and a forward space file command is  
31 received, with said virtual head position being  
32 immediately after said last data block, said emulation  
33 is executed.

1 16. The method for controlling a magnetic tape unit  
2 according to claim 7, wherein in a state in which only  
3 said second end-of-file label is saved in said save  
4 area, and in a state in which reading/writing up to  
5 said third tape mark is completed and the real head  
6 position is said predetermined position in said  
7 magnetic tape unit;

8           when any one of a read backward command, a back  
9 space block command and a back space file command is  
10 received, with said virtual head position being  
11 immediately after said third tape mark;

12           when any one of a read command, a read backward  
13 command, a back space block command, a back space file  
14 command, a forward space block command, a forward  
15 space file command and a write tape mark command is  
16 received, with said virtual head position being  
17 immediately after said second tape mark;

18           when any one of a read command, a read backward  
19        command, a back space block command, a back space file  
20        command, a forward space block command and a forward  
21        space file command is received, with said virtual head  
22        position being immediately after said second end-  
23        of-file label;

24           when any one of a read command, a read backward  
25        command, a back space block command, a back space file  
26        command, a forward space block command and a forward  
27        space file command is received, with said virtual head  
28        position being immediately after said first end-  
29        of-file label;

30           when any one of a read backward command, a back  
31        space block command, a back space file command, a  
32        forward space block command and a forward space file  
33        command is received, with said virtual head position  
34        being immediately after said first tape mark; or

35           when any one of a read command, a forward space  
36        block command and a forward space file command is  
37        received, with said virtual head position being  
38        immediately after said last data block, said emulation  
39        is executed.

1    17. The method for controlling a magnetic tape unit  
2    according to claim 7, wherein in a state in which  
3    neither said first end-of-file label nor said second  
4    end-of-file label is saved in said save area, and in

5 a state in which reading/writing up to said second tape  
6 mark is completed and the real head position is said  
7 predetermined position in said magnetic tape unit;  
8       when any one of a read backward command, a back  
9 space block command and a back space file command is  
10 received, with said virtual head position being  
11 immediately after said second tape mark;

12       when any one of a read command, a read backward  
13 command, a back space block command, a back space file  
14 command, a forward space block command, a forward  
15 space file command and a write tape mark command is  
16 received, with said virtual head position being  
17 immediately after said second end-of-file label;

18       when any one of a read backward command, a back  
19 space block command, a back space file command, a  
20 forward space block command and a forward space file  
21 command is received, with said virtual head position  
22 being immediately after said first end-of-file label;

23       when any one of a read backward command, a back  
24 space block command, a back space file command, a  
25 forward space block command and a forward space file  
26 command is received, with said virtual head position  
27 being immediately after said first tape mark; or

28       when any one of a read command, a forward space  
29 block command and a forward space file command is  
30 received, with said virtual head position being  
31 immediately after said last data block, said emulation

32 is executed.

1 18. The method for controlling a magnetic tape unit  
2 according to claim 7, wherein in a state in which  
3 neither said first end-of-file label nor said second  
4 end-of-file label is saved in said save area, and in  
5 a state in which reading/writing up to said third tape  
6 mark is completed and the real head position is said  
7 predetermined position in said magnetic tape unit;

8 when any one of a read backward command, a back  
9 space block command and a back space file command is  
10 received, with said virtual head position being  
11 immediately after said third tape mark;

12 when any one of a read command, a read backward  
13 command, a back space block command, a back space file  
14 command, a forward space block command, a forward  
15 space file command and a write tape mark command is  
16 received, with said virtual head position being  
17 immediately after said second tape mark;

18 when any one of a read command, a read backward  
19 command, a back space block command, a back space file  
20 command, a forward space block command and a forward  
21 space file command is received, with said virtual head  
22 position being immediately after said second end-  
23 of-file label;

24 when any one of a read backward command, a back  
25 space block command, a back space file command, a

26 forward space block command and a forward space file  
27 command is received, with said virtual head position  
28 being immediately after said first end-of-file label;

29       when one of a read backward command, a back  
30 space block command, a back space file command, a  
31 forward space block command and a forward space file  
32 command is received, with said virtual head position  
33 being immediately after said first tape mark; or

34       when one of a read command, forward space block  
35 command and a forward space file command is received,  
36 with said virtual head position being immediately  
37 after said last data block, said emulation is  
38 executed.

1 19. The method for controlling a magnetic tape unit  
2 according to claim 7, wherein when, in a close process  
3 for said file, a command requiring to write said third  
4 tape mark is received after said second tape mark is  
5 written on said magnetic tape, completion of a writing  
6 of said third tape mark is reported to said command  
7 issuing apparatus without writing said third tape  
8 mark.

1 20. The method for controlling a magnetic tape unit  
2 according to claim 19, wherein when a command  
3 directing to position said head outside a region from  
4 immediately before said first tape mark to immediately

5 after said third tape mark is received, said third tape  
6 mark is written, and said magnetic tape unit is then  
7 made to carry out a tape operation according to said  
8 command.

1 21. The method for controlling a magnetic tape unit  
2 according to claim 19, wherein when EOD (End Of Data)  
3 is detected after said second tape mark in said  
4 magnetic tape unit during a tape operation in response  
5 to a command from said command issuing apparatus,  
6 detection of said third tape mark is reported in lieu  
7 of detection of said EOD to said command issuing  
8 apparatus.

1 22. A method for controlling a magnetic tape unit in  
2 response to a command from a command issuing apparatus  
3 comprising the steps of:

4           in a close process for a file recorded on a  
5 magnetic tape, controlling a tape operation of said  
6 magnetic tape unit such that, on said magnetic tape,  
7 the first tape mark is written after the last data  
8 block of said file, at least one end-of-file label is  
9 written after said first tape mark, and the second tape  
10 mark is written after said end-of-file label, and  
11 reporting completion of a writing of said third tape  
12 mark to said command issuing apparatus without writing  
13 said third tape mark even if a command requiring to

14 write said third tape mark is received.

1 23. The method for controlling a magnetic tape unit  
2 according to claim 22, wherein when a command in a  
3 motion system involving unloading and rewinding is  
4 received, said third tape mark is written, and said  
5 magnetic tape unit is then made to carry out a tape  
6 operation according to said command in the motion  
7 system.

1 24. The method for controlling a magnetic tape unit  
2 according to claim 22, wherein when EOD (End Of Data)  
3 is detected after said second tape mark in said  
4 magnetic tape unit during a tape operation in response  
5 to a command from said command issuing apparatus,  
6 detection of said third tape mark is reported in lieu  
7 of detection of said EOD to said command issuing  
8 apparatus.

1 25. The method for controlling a magnetic tape unit  
2 according to claim 6, wherein a plurality of end-  
3 of-file labels are recorded as one physical block on  
4 said magnetic tape by a packeting function;  
5       when a command directing to read one of said  
6 plurality of end-of-file labels is received in a close  
7 process for said file, said one physical block  
8 including the end-of-file label to be read is read out

9 from said magnetic tape and stored in said data buffer;  
10 and

11 in an open process for said file, an end-  
12 of-file label corresponding to a command directing to  
13 read the one of said plurality of end-of-file labels  
14 is read out from said data buffer in response to said  
15 command and transferred to said command issuing  
16 apparatus.